Science
Library

42

ROCKS and MINERALS

A Magazine for Mineralogist, Geologist and Collector . .

SEP 15 1937

. . . . . Official Journal of
The Rocks and Minerals Association

..SEPTEMBER, 1937..

Vol. 12 No. 9 TWENTY-FIVE CENTS Whole No. 74

Lazulite xls. Georgia

We have in stock 9 specimens of white sandstone containing Lazulite in perfect xls. While this sandstone carries many xls, the Lazulite is so fragile that it is difficult to obtain specimens which will show even one perfect xl, broken xls are rather common at this location. The xls are about ½" in length and their bright blue color is well set off by the white sandstone.

1x1"	$1.00	1½x2"	$2.00	2x3"	$3.50
1x1½"	$2.00	1½x2½"	$2.00	2½x3"	$3.50
1x2"	$1.50	2x2½"	$2.00	2½x4½"	$4.00

Thulite, the pink var. of zoisite, N. C. Nice specimens in white feldspar.

1" 15c; 1½" 25c; 2" 50c; 3" 75c.

R. W. TUTHILL

110 EARL ROAD **MICHIGAN CITY, IND.**

Rough and Polished Minerals

In rough minerals we have loose crystals, crystals in matrix, ores, massive minerals and rocks in beginners' to musem sizes and from all over the world, including many rare items and specimens from old and historic localities. We offer the cutter a stock of minerals for cabochon cutting, faceting or polishing for cabinet display. Polished minerals range from small cabochons to large agate slabs, etc. New and out of print books are also in stock.

Friends who travel tell us that ours is the most notable stock they have seen in the West. Many of the supporters of **Rocks and Minerals magazine** have been our steady customers for years. You too might be pleased with our values and service if you give us an opportunity to demonstrate them. Send a stamp for price lists and circulars, and let's get acquainted.

THE GEM SHOP

ESTABLISHED IN 1919

Box A-797 **Helena, Montana, U. S. A.**

ROCKS and MINERALS

PUBLISHED MONTHLY

Edited and Published by PETER ZODAC

SEPTEMBER . . 1937 . .

CONTENTS FOR SEPTEMBER, 1937

Old Nick's Copper. By Nicholas A. D'Arcy, Jr. 259

The Oldest Meteorite 264

A List of Minerals Found in Pegmatites and Granites. By David M. Seaman 265

Agatized Cones From Argentina 267

The Calico Mountains. By W. Scott Lewis 268

Some Old Localities in Connecticut. By Wilbur J. Elwell 270

Selenite Crystals at Ellsworth, Ohio. By Gerald U. Greene 272

A Utah Outing. By C. J. Rordell 274

An Accurate Easily Made Specific Gravity Scale. By Edwin Roedder 278

The Amateur Lapidary. Conducted by Arthur Knapp 283

Stone Cutting As a Hobby for Women. By Lillian M. Oterson 283

Entered as second-class matter September 13, 1926, at the Post Office at Peekskill, N. Y., under the Act of March 3, 1879.

Copyright 1937 by Peter Zodac **Title registered in U. S. Patent Office**

Specially written articles (as Contributions) are desired.

Subscription price $2.00 a year; Current numbers, 25c a copy. No responsibility is assumed for subscriptions paid to agents and it is best to remit direct to the Publisher.

Issued on the 1st day of each month.

Authors alone are responsible for statements made and opinions expressed in their respective articles.

ROCKS and MINERALS PEEKSKILL, N. Y., U. S. A.

The Official Journal of the Rocks and Minerals Association

CHIPS FROM THE QUARRY

TO OUR READERS

There is apparently a misunderstanding in the minds of some of our readers regarding our plans for special quartz numbers. Some think we shall issue one big number in which all varieties of quartz minerals will be featured. This is not so.

We plan to issue a series of numbers but devoting only one variety of quartz to a number. Thus the combined September-October 1936 issue was a Special Agate Number; the February, 1937, issue was a Special Rock Crystal Number. The next special number may be devoted either to amethyst or geodes.

Cards have been received from Mr. and Mrs. Richmond E. Myers who are attending the Seventeenth International Geological Congress at Moscow, Russia, as representatives of the Rocks and Minerals Association. The cards, dated July 12th and mailed from Borjami, Georgia, U. S. S. R., read in part "Up to the above date we have done practically no mineral collecting altho we have crossed the Caucasus and traveled thru Armenia to the Persian frontier. We are now en-route to a bathing resort on the Black Sea for a few days rest before going to the session in Moscow. The country is very interesting from a geographer's viewpoint but geologically we can match everything we have seen so far in the U. S. A."

On their return to America, Mr. Myers plans to write an article or two for **Rocks and Minerals** on their experiences and we believe our readers will find them to be as intensely interesting as were his two on "Mineral Collecting in Norway" and "Mineral Collecting in Spitzbergen" which appeared in the January and February, 1936, issues, respectively.

NEW MINERAL CLUB IN CHICAGO

A new society for the study of rocks, minerals, fossils, gems, as well as lapidary work, and known as the Marquette Geological Association, was recently organized in Chicago, Illinois. Meetings are to be held on the 1st Saturday of every month at Marquette Institute, 189 N. Clark St., Chicago. The coming September meeting, however, will be held on the 2nd Saturday, Sept. 11th, and the subject for the evening will be Quartz. Mr. Wm. E. Menzel will be the chief speaker.

The officers of the new society are: Chairman, H. C. Walther; Vice-Chairman, Wm. E. Menzel; Secretary-Treasurer, Dr. A. C. Souton; Curator-Librarian, Miss Selma Jenner.

Miss Evelyn Glantz and two girl companions, all of Brooklyn, N. Y., are touring New England on bicycles. Many mineral localities are planned to be visited on this unique trip and if enough interesting specimens are collected, Miss Glantz might be induced to write an article on their experiences.

Alvin E., and Raymond E. Schortmann, brothers and proprietors of Schortmann's Minerals of Easthampton, Mass. (largest mineral dealers in New England), have recently returned from a 1500-mile trip through Ontario and Quebec, Canada. A large quantity of excellent specimens of sodalite, fluorescent wernerite, phlogopite crystals, lepidomelane crystals, and many other desirable items were collected that will enrich their already extensive stock.

A subscriber inquires about petrified pearls. Have any of our readers heard of such pearls?

ROCKS and MINERALS

PUBLISHED MONTHLY

Edited and Published by PETER ZODAC

SEPTEMBER ..1937..

VOL. 12 NO. 9

The Official Journal ROCKS and MINERALS of the ASSOCIATION

WHOLE No. 74

OLD NICK'S COPPER

By NICHOLAS A. D'ARCY, JR.

The main commercial ores of nickel are rather uninteresting from the standpoint of a mineral collector but the history, refining, and uses of nickel are .exceedingly interesting. Nickel ores come from a French penal island, New Caledonia, located about one thousand miles north and east of Australia, and from Sudbury, Canada, a bleak cold barren section of Canada about two hundred miles north of Toronto.

The ores are as different as the sources. New Caledonia's main ore mineral is garnierite, a hydrous silicate of nickel and magnesium. Garnierite is a product of weathering in serpentine and occurs in sheets from twenty to thirty feet in thickness. Sudbury produces nickel from a number of dull sub-metallic appearing minerals, few of which include nickel in their chemical formulas. Pyrrhotite is the commonest mineral in the district but pentlandite and chalcopyrite are also very important. Field investigations indicate that the Sudbury ore bodies were formed by selective solidification of intrusive magmas, however, laboratory study of thin sections and polished specimens under the microscope indicate a secondary enrichment. One thing is certain, the ore body of the Frood mine, one of the largest, extends 3100 feet under the ground and has enough ore blocked out to meet the present demand for 200 years. All Sudbury ores are in the nickel bearing intrusive at its contact with norite.

Legends are full of tales of the wonderful deeds made possible with swords forged from Heaven sent steel. Seigfried was able to split the anvil asunder upon which he reforged "the gift that was Odin's, a sword for the world to praise." Greek, Arabian, Persian and other ancient legends tell of wonderful deeds made possible by the wonderful swords forged from steel sent by the gods. These tales may have a world of truth. Who knows but what a watchful hunter or herdsman saw a metorite fall; overcame his primitive fear of the supernatural and unearthed a piece of heaven sent steel that would produce weapons outclassing any his rivals might have. The Encycopedia Britannica tells us, "Analyses of prehistoric iron weapons show many contain considerable nickel. This combination invariably occurs in metoric iron."

Nickel bearing coins dating from 225 B. C. are in existance in the South Kensington Museum, London. It is a long step from these copper-nickel coins from Bactria to the discovery of nickel in Germany. We find the German miners working a promising body of ore in Saxony. Copper and silver are the expected reward but all they could produce was a whitish brittle meta called "Old Nick's Copper." It coud not be worked to pro-

duce either copper or silver yet both were recovered from similar ores in the neighborhood. The ore must be bewitched! It was cursed and called "The Devil's Own" for surely the good spirits could have nothing to do with such promising yet stubborn ore. The name stuck and "Kufernickel" (Old Nick's Copper) it became and now we know that the troublesome metal was our nickel. Its reputation was such that it earned the name of nickel in modern tongues the world round.

The Chinese did not have Old Nick on their heels and they produced a white metal called "Paktong" or "White Copper" which was suitable for working into art objects and ornaments. These paktong articles were shipped from Canton to England and became very popular. The alloy was produced in sufficient quantity to be used as ballast in the sailing ships on their return voyages and this marks the event of commercial nickel alloys.

In 1751 Axel F. Cronstedt identified the new element nickel from the Swedish ore. From this point on science has taken a very active part in developing new uses for nickel. In the early 1800s J. B. Richter produced the first pure nickel. Soon after, synthetic "Paktong" was made in England as an experiment and several years later was imported from Berlin as "German Silver" (a copper-nickel-zinc alloy). The popularity of German silver started a world wide search for nickel.

Michal Farady became interested in nickel bearing metorites and their characteristics and began to experiment with nickel-iron alloys. Perhaps of greater renown are his electrical experiments which lead to electroplating, not of nickel at first but of German silver.

In 1850 the Swiss government decided to use nickel in its coins, adding enough silver to give the coins their face value. The resulting alloy was not workable and much trouble was experienced. It was not until 1860 that the Belgian Congo government minted coins having similar characteristics to the 2000 year old copper-nickel alloy coins of Bactria. Once the step was taken other nations were fast to follow and the demand for nickel exceeded the supply. Norwegian ores could not supply the need and ore was discovered at the other end of the globe, New Caledonia, to meet the demand. In a brief 60 years over eighty countries have coined nickel alloy token coins.

American Production.

Old Nick followed the miners to North America. Joseph Warton was the first important producer on this side of the Atlantic. His copper-nickel mine at Lancaster Gap, Pennsylvania, produced nickel that was sold to the mint and German silver makers.

W. E. C. Eustis and Robert M. Thompson became interested in a nickel sulphide deposit near Orford, Quebec, Canada. The ore was too difficult to work and Old Nick reigned. They then bought a near-by copper mine and built a copper refinery at Laurel Hill, Long Island. All went well until Eustis withdrew, took his ores with him, and left Thompson with a refinery and nothing to refine. Senator W. A. Clark became interested and supplied some money and ore.

The Canadian Pacific Railway began to push north and prospectors pushed on ahead of it. A highly mineralized area was discovered at Copper Cliff. Here was a substantial deposit and Laurel Hill received shipments of the ore. Old Nick was riding on the first carload! Laurel Hill could do nothing with it and sent the consignment to the Orford works, New Jersey. Thompson's chemists discovered the nickel and reported the news to Canada. Mine owners, who had large bodies blocked out, were told that their ore could not be smelted. The future did not look bright. The winters were severe, labor was scarce, equipment was bad, and the backers of the mines were short of funds. The smelters were as bad off. The Orford works were built

on filled swamp land, the sulphur fumes brought the local authorities to the smelter, the copper ore proved to be copper-nickel and could not be smelted.

Thompson and Richie, who had built a railroad into Ontario years before in search of iron, set out to beat Old Nick. Thompson had a smelter and tried to devise a way to smelt nickel and Richie to develop a market for the metal when smelted. Both were successful. Thompson spurned the wet methods of recovery as they were not suitable for his equipment and had a very limited production. What Thompson needed was a large scale method of separating copper and nickel in his furnaces. After many trials and much study an accidential discovery led to his success. A re-smelt batch of the acid-leached residue contained a clean up of various residues from a near-by chemical plant. When the melt had been tapped, cast into pots, and cooled, it was noticed that the upper two thirds was crumbly and dark and the bottom third was a bright sulphide. Tests showed that the bottom third was almost pure nickel sulphide. After many trials it was found that the chemical that produced this remarkable separation was niter cake, a by-product of nitric acid manufacturing.

When the process was perfected Thompson applied for a patent and found Old Nick once again on the job. A shoemaker had accomplished the same results on his kitchen stove in an iron pot 17 years before. Further search revealed that Gustave von Engstrom of Sweden, had melted paktong in 1776 with "Hepar Sulphuris" (sulphide of an alkali) and secured two metals, "one that was red and forgeable was real copper, and the other was greyish white, brittle, with a fracture like steel."

In the meantime, the Naval Department had been experimenting on nickel-bearing armor plate and Thompson, an Annapolis man, was commissioned to supply the nickel. A rather terrible ferro-nickel was produced by the wet method of refining then available. Results obtained by adding this to steel were so convincing that the acceptance of nickel-bearing armor plate brought about a second shortage of nickel.

Another process was being developed in England. Simplicity of principle was the keynote of this process. It was discovered that carbon-monoxide gas would dissolve finely divided nickel at temperatures below 80 degrees C. and form nickel-carbonyl gas. The compound broke down giving pure nickel and carbon-monoxide gas at temperatures in excess of 200 degrees C. Pure nickel was produced commercially by circulating the cooled gas over finely divided nickel and then heating the resulting nickel-carbonyl in another chamber. Many practical problems had to be solved before a successful plant could be built. This method, known as the Mond process, is used in England for recovery of nickel. The process has two major problems, first, the copper must be removed from the matte (this is done by dissolving the copper in sulphuric acid and selling the copper sulphate) and second, the carbon-monoxide will not dissolve a large amount of nickel at one time. The solution of the second is to build a continuous circuit in which the gas passes over the nickel, is heated, and deposits the pure nickel. The gas is cooled and again passed over the impure nickel.

Refining.

The standard method now used for refining nickel is to crush the ore. The crushed ore is introduced into the top of multiple deck roasters where some of the sulphur is driven off. As the ore proceeds by gravity from roaster to roaster the temperature increases until it is just below the melting point of the ore. The almost molten ore drops from the last roaster into the reverberatory furnace where it is melted and still more sulphur driven off. The reverberatory furnaces are tapped into ladles and the liquid consisting of copper, iron, and

nickel is transported to a basic converter. Air is blown thru the converter and reacts with the iron to form iron-oxide slag and frees sulphur. Nickel-copper matte is drawn from the converter and cast into molds. The matte is then charged into a blast furnace along with coke, flux, and sodium sulphate. The sodium sulphate dissolves the copper and iron but does not react with the nickel sulphide. When the furnaces are tapped into ladles and the solution allowed to cool we find the copper has solidified on the top and the nickel on the bottom with a sharp cleavage line between the two. The nickel bottom containing about 35 per cent nickel is either refined electrolitically at Niagara Falls or shipped to Engand for refining by the Mond process.

Uses.

Once Old Nick was conquered he proved as great an asset to modern civilization as the Heaven sent swords had been to heroes of the legends.

The great demand for armor plate prior to 1918 marked the birth of nickel as a widely used element. All nickel producing properties and refineries were worked to their capacity from 1914 to 1918. The Armistice brought about a collapse of the nickel industry but not for long. Swords were to prove very effective as plow shares, especially snow plow shares. A period of intense research on nickel alloys and of education of engineering organizations to the value of nickel alloys soon created a satisfying market for nickel.

Nickel alloy steel was deveoped to withstand great cold without becoming brittle. Snow plows made use of nickel steel castings. De-waxing chambers were built by the oil refineries operating at temperatures as low as minus 100 degrees where failure would cost many lives and dollars. Machines to manufacture liquid air and liquify rare gasses were built operating at temperatures as low as minus 300 degrees. Nickel alloy steels retained their toughness at these low temperatures. Ordinary steel would have been very brittle and unable to resist the impact of the operating machines.

It is a long step from liquid air machines to boilers but nickel alloys make it without hesitation. The present trend in boilers is higher pressure and lighter weight. The Canadian Pacific Railway made use of nickel steel plate in locomotive boilers and increased the boiler pressure 25% without increasing the weight. Cast nickel steel grate bars, cylinders, and pistons also served to increase the strength and wearing properties of the new locomotives. The ability of nickel steel to retain strength and toughness at high temperatures makes it very valuable in boilers.

Steam again comes into contact with a nickel alloy, this time at speeds as high as forty miles a minute. The vanes and separators in the turbines of the S. S. Bremen are made of monel metal. This metal has toughness, the strength of steel, immunity to rusting, and resistance to erosive effect of super-heated steam. Monel metal is an interesting alloy, it being one of the most useful of the nonferrous alloys. The Creighton mine near Sudbury produced ore assaying roughly two-thirds copper and one-third nickel. This ore, when freed of its sulphur, produced a natural alloy of Monel metal. This is one very useful copper-nickel alloy where Old Nick would have been fooled but ore of the proper proportions did not present itself until nickel refining had been mastered.

Invar is another interesting nickel alloy. This alloy has interesting expansion characteristics. Invar, a 36% nickel alloy, has practically no expansion when heated thru normal room temperatures. Tapes made of this alloy are used by the United States Geological Survey in precise measurements. The Bureau of Standards has found that Invar tapes will vary less than one part in 500,000 after six months use.. It is possible to produce every change in co-effi-

cient of expansion by changing the per cent of nickel in the alloy from practically nothing in Invar to the coefficient of pure nicckel. An alloy having 46% nickel, called Platinite, is used as a substitute for platinum as it has almost the same co-efficient of expansion as platinum. A 56% nickel-iron alloy has the same expansion as steel and is useful for industrial measuring machines. Such machines are corrosion resistant, very stable, and make temperature corrections unnecessary. Many other useful uses could be cited for various nickel alloys with different rates of expansion.

Pure nickel sheets are now rolled on common carbon steel plates to form what is called nickel-clad plates. These possess the strength of steel and the resistance to corrosion of pure nickel. The sheets are rolled at a temperature high enough to form a weld between the two. A practical use of nickel-clad is in the construction of railroad tank cars used to haul corrosive liquids and acids.

Nickel alloys also have conflicting electrical properties. Permalloy, containing 76% nickel, has very high magnetic permability and low hysteresis loss. This enables the alloy to build up a strong magnetic field very quickly and when the current is cut off lose practically all of its magnetism at once. Submarine cables require a wrapping of high permability to produce the required loading. The wrappings had characteristics prohibiting transmission of over 300 words per minute prior to the development of permalloy. Permalloy wrapped cables permit transmission of 1500 words per minute with ease.

An alloy having uniform elasticity at varying temperatures is produced by replacing 12% of the iron in Invar with chromium. This alloy is also practically immune to magnetic fields and resists rusting and corrosion. Hair springs made of Elinvar therefore do not vary in characteristics with changing temperatures and are not affected by magnetism. This simplifies watch balance wheel construction and provides for a more accurate timepiece.

Nickel alloy cast steels have an interesting use for the mining man. These steels are harder and stronger than cast steel yet can be cast from the cast steel patterns at no increase in weight. It is possible to produce castings that will wear several times as long as steel and yet weigh no more by the use of cast nickel steel. This is important in localities that are cut off from the sources of supply during the winter months or located far from manufacturers headquarters.

Three interesting alloys of nickel cast iron are "Ni-Hard," "Ni-Resist," and "Ni-Tensyliron." Ni-Hard rolls, used in the steel mills for rolling sheet steel, retain their shape ten times as long without re-grinding and have a total life several times as great as cast iron. Ni-Resist finds great application in the oil refining industry and paper manufacturng. Pump impellers, valves, pipe, condensors, and bubble towers are all subjected to corrosive liquids and great heat. Ni-Tensyliron is from two to three times as strong as cast iron. Oil well mud circulating pumps were not strong enough to withstand pressures encountered in deep wells. Ni-Tensyliron pumps, cast from the cast iron patterns, are built which have double the capacity and increased resistance to wear at no increase in weight and small increase in cost.

Rotary oil well drilling depends upon the characteristics given steel by nickel in many instances. Drilling bits are subjected to very great loads, high impact and much abrasion; yet the working parts must be small. Nickel steel makes their construction possible. Nickel steel forgings give the shafts of heavy drilling machinery the required strength and toughness. Bearings capable of rotating up to 150 times a minute when carrying a load of 300 tons are built of nickel steel alloys and run on nickel steel races. The very heart of modern oil well drilling is nickel steel forgings and castings.

It is certain that modern research

has succeeded in besting Old Nick and in turning the sword into the plowshare and the armor plate into modern machinery.

NOTE: The author is indebted to the technical publications of The International Nickel Co., Inc., and Mr. Albert G. Zima of the Research and Development Department of the above company for much of the information in this article.

THE OLDEST METEORITE

"The oldest meteorite on record of which specimens were preserved by witnesses who actually saw its fall is one which dropped into the little village of Ensisheim, Alsace, on November 16, 1492 (just about a month after Columbus's discovery of America)," writes Henry W. Nichols, chief curator of geology at Field Museum of Natural History, in the current issue of Field Museum News.

Specimens of this meteorite, and a print of a wood-cut by a fifteenth century artist depicting the fall of the visitor from the heavens, are on exhibition at the museum. The woodcut is reproduced in an illustration accompanying Mr. Nichols' article in the museum bulletin, which is published for the several thousand members of the institution.

"The 'thunderstone,' as the villagers called it, fell shortly before noon, 'with a loud crash of thunder and a noise heard afar off,' in a field at Ensisheim, according to old records," Mr. Nichols states. "It made a hole five feet deep from which the inhabitants excavated it. The weight of the stone was 260 pounds. Two small pieces were broken off, one for presentation to King Maximilian, and one for Duke Sigismund of Austria. The remainder of the meteorite, regarded as a miraculous object, remains to this day in the village hall of Ensisheim.

"The quaint drawing by a contemporaneous artist shows two villages of medieval architecture—Ensisheim, and its neighbor, Battenheim. The meteorite is seen breaking through a cloud above them, its path marked by accompanying rays of light. Its fall is being watched by startled villagers. Titles, one in ancient German above, and one in Latin below the picture, translate into 'The thunderstone that fell in 1492 before Ensisheim.' There is also a rhymed couplet in old German which may be translated freely:

" 'If you would seek wonderment,
Then observe this strange event'."

Field Museum's collection of meteorites is the most comprehensive in the world. Their importance lies in the fact that meteorites are the only tangible objects to reach the earth from the extra-terrestrial realm. Altogether there are more than 700 specimens in the museum, comprising more than two-thirds of all recorded falls, and embracing both stone and iron specimens with an aggregate weight of several tons. Included is the largest stone meteorite ever seen to fall, which struck the earth near Paragould, Arkansas, on February 17, 1930. Fifty-two per cent. of the specimens in the collection were actually seen falling; the others were identified as meteorites through peculiarities of structure and composition not found in anything of earthly origin.

A LIST OF MINERALS FOUND IN PEGMATITES AND GRANITES

By DAVID M. SEAMAN

Pegmatites and granites are the homes of a greater variety of mineral species than any other type of rock. The minerals listed have been found chiefly in pegmatites and where found in granite, are specified as such.

The minerals of the pegmatites and granites are grouped together because of their relationships, that of the pegmatites being the coarse phases of granites, and the last products to cool from the granitic magma. Thus the pegmatites are usually found as dikes in the granite itself or in the gneisses or schists, rocks which are closely related to the granites.

1. Achroite
2. Acmite
3. Aeschynite
4. Albite
5. Allanite
6. Almandite
7. Alurgite
8. Amazonite
9. Amblygonite
10. Amethyst
11. Ampangabeite
12. Analcite (in granite)
13. Ancylite
14. Andalusite (rarely in granite)
15. Annite
16. Apatite
17. Apophyllite
18. Aquamarine
19. Arfvedsonite
20. Arizonite
21. Arsenopyrite
22. Astrophyllite
23. Auerlite
24. Autunite
25. Axinite (in granite)
26. Azurite
27. Babsohismutite
28. Baddeleyite
29. Barylite
30. Bastnasite
31. Bavenite
32. Bazzite
33. Beryl
34. Bertrandite
35. Beryllonite
36. Betafite
37. Biotite
38. Bismuth
39. Bismutite
40. Bismuthinite
41. Bismutospharite
42. Bismutotantalite
43. Bityite
44. Blomstrandine
45. Bodenbenderite
46. Bornite
47. Bromellite
48. Buszite
49. Canbyite
50. Cappelenite
51. Caryocerite
52. Cassiterite
53. Catapleiite
54. Cenosite
55. Centrallassite
56. Cerite
57. Chalcanthite
58. Chalcolamprite
59. Chalcopyrite
60. Childrenite
61. Chiolite
62. Chrysoberyl
63. Citrine
64. Clarkeite
65. Cleavelandite
66. Columbite
67.. Cookeite
68. Corundum (in granite)
69. Cryolite
70. Cryolithionite
71. Curite
72. Dachiardite
73. Danalite
74. Dawsonite
75. Delorenzite
76. Dewindtite
77. diamond (reported in situ in a pegmatite vein in gneiss at Bellary, India)
78. Dickinsonite
79. dumontite
80. Elpidite
81. Ellsworthite
82. Eosphorite
83. Emerald

84. Epididymite
85. Epidote
86. Epistolite
87. Eschwegeite
88. Euclase
89. Eucryptite
90. Euxenite
91. Fairfieldite
92 Ferberite
93. Fergusonite
94. Fillowite
95. Fluocerite
96. Fluorite
97. Fremontite
98. Fourmarierite
99. Gadolinite
100. Galena
101 Gearksutite
102. Goethite
103. Gold
104. Goshenite
105. Graftonite
106. Gramodidierite
107. Graphite
108. Griphite
109. Gummite
110. Halloysite (in granite)
111. Hambergite
112. Hatchettolite
113. Hellandite
114. Helvite
115. Hematite
116. Herderite
117. Heulandite
118. Hiddenite
119. Hielmite
120. Hubnerite
121. Hureaulite
122. Hyalite
123. Hyblite
124. Hydrothorite
125. Ilmenite
126. Indicolite
127. Irvingite
128. Ishikawaite
129. Johnstrupite
130. Kasolite
131. Kaolinite
132. Kimolite
133. Kolbeckite
134. Koppite
135. Kunzite
136. Kyanite
137. Landesite
138. Lanthanite
139. Laumontite (in granite)
140. Lazulite
141. Leifite
142. Lepidolite
143. Lepidomelane (in granite)
144. Lessingite
145. Leucophanite
146. Leucosphenite
147. Limonite
148. Lithiophilite
149. Loparite
150. Lorenzenite
151. Mackintoshite
152. Magnetite
153. Malachite
154. Manandonite
155. Melanocerite
156. Meliphanite
157. Mendelyeevite
158. Microcline
159. Microlite
159. Milarite
160. Milarite
161. Molybdenite
162. Monazite
163. Monrepite (in granite)
164. Montmorillonite
165. Morganite
166. Mosandrite
167. Muscovite
168. Narsarsukite
169. Natrophilite
170. Neotantalite
171. Neptunite
172. Octahedrite (in granite)
173. Orthoclase
174. Pachnolite
175. Palaite
176. Parisite
177. Parsonite
178. Petalite
179. Phenacite
180. Phosphuranylite
181. Pisekite
182. Pollucite
183. Polycrase (in granite)
184. Polylithionite
185. Polymignite
186. Prehnite (in granite)
187. Prochlorite (in granite)
188. Prosopite
189. Psilomelane
190. Pyrrhite
191. Pyrite
192. Purpurite
193. Crystal quartz
194. Smoky quartz

195. Amethyst quartz
196. Rose quartz
197. Citrine quartz
198. Vein quartz
199. Ralstonite
200. Reddingite
201. Rhodizite
202. Rhodochrosite
203. Riebeckite
204. Risorite
205. Rowlandite
206. Rubellite
207. Rutile
208. Salmonsite
209. Samarskite
210. Samiresite
211. Serandite
212. Sarcopside
213. Scheelite
214. Sicklerite
215. Siderite
216. Sillimanite (in granite)
217. Sklowdowskite
218. Soddyite
219. Sphalerite
220. Spinel
221. Spodiophyllite
222. Spodumene
223. Stewartite
224. Stibiotantalite
225. Stilbite (in granite)
226. Strigovite (in granite)
227. Taeniolite
228. Tantalite
229. Tapiolite
230. Tengerite
231. Thalenite
232. Thomsenolite
233. Thorianite
234. Thorite
235. Thorogummite
236. Thortveitite
237. Titanite
238. Toddite
239. Topaz
240. Torbernite
241. Tornebohmite
242. Tourmaline
243. Trimerite
244. Triplite
245. Triploidite
246. Triphylite
247. Tritomite
248. Tscheffkinite
249. Uraninite
250. Uranocircite
251. Uranophane
252. Uranosphaerite
253. Uranosphathite
254. Uranospinite
255. Uranothallite
256. Ussingite
257. Vauxite
258. Vilateite
259. Vivianite
260. Voglite
261. Wavellite
262 Wohlerite
263. Wolframite
264. Xenotime
265. Yttrofluorite
266. Yttrogummite
267. Yttrialite
268. Yttrotantalite
269. Zinnwaldite
270. Zircon
(and others).

Reference Dana's Textbook of Mineralogy, Fourth Edition, by W. E. Ford 1932.

Agatized Cones From Argentina.

An extensive series of fossil cones from prehistoric evergreen trees has been added to the paleontological exhibits at Field Museum of Natural History, Chicago. They were collected by the Marshall Field Paleontological Expedition to South America, in the Cerro Cuadrado fossil forest, province of Santa Cruz, Argentina. The cones, which are agatized, include many beautiful specimens which have been sectioned and polished. Beside them are exhibited, for comparison, specimens from modern trees. The fossils are so well-preserved that they show in detail the seed-bearing structures. When discovered, they had been eroded from a bed of volcanic ash, near two volcanic craters which poured out sheets of lava about 35,000,000 to 40,000,000 years ago. The volcanic ash then thrown out probably preserved them, according to Elmer S. Riggs, curator of paleontology.

THE CALICO MOUNTAINS

By W. SCOTT LEWIS

The hectic history of the Calico Mountains dates back to the year 1881 when two prospectors made their way up a highly colored canyon carved through strangely contorted strata, and discovered ore so rich in silver that even when shipped to a distant smelter in sacks, it still netted over $150 a ton. The mining camp which sprang up with the rapidity characteristic of the old west was named Calico because of the brilliant coloring exhibited by the surrounding formations. In the years that followed, a fortune in silver was extracted from the cliffs facing on Wall Street and Odessa canyons, but today only a few buildings remain and there is little outward evidence of past activities.

Collectors entering California through southern Nevada or central Arizona during the cooler months of the year will find much of interest in the Calico region, including at least one mineral found in very few collections. The various localities are all easily reached from Highway 91 by turning off between the towns of Yermo and Barstow over good dirt roads. There are three main points of interest: Lead Hill, Calico, and Borate, each some miles from the others.

The dumps on Lead Hill are plainly visible to the north from Highway 91 at a height of land some miles west of Yermo, but the mine is reached over an unmarked dirt road which turns north about four miles east of Barstow. This should be followed until one comes to a fork where one must take the right hand road. The principal minerals found here are galena, large masses of crystalline barite, and siderite. The latter will be found in large, pure, coarsely crystalline fragments about the lower dump.

The Calico mines are located about five miles northwest of Yermo and are reached over a plainly marked road. Visitors on Sunday may enter the principal mine with a guide and will find this visit of real interest. The silver minerals are cerargyrite and embolite in a gangue of barytes, but specimens of great value should not be expected. The visitor should by all means take a walk up through Wall Street canyon and note the remarkable series of synclines and anticlines exhibited there as well as the remarkable box-like end of the canyon. He will also probably wish to visit 'Boot Hill" with its many graves piled with rocks to discourage the coyotes. Here one will find boards with raised letters, the wood having been eaten away by flying sand except where it was protected by paint. Just east of Calico a one-way road winds up through Odessa Canyon, one of the most scenic places in the west, although it is the writer's suggestion that the best way to see the canyon is to hike up through it. In places it is so narrow that a car can scarcely get through, the grade is rather heavy, and when one is in a car there is nothing to be seen but the base of the cliffs on each side.

The most interesting locality from the standpoint of the mineralogist is the old borax mine at Borate. In order to reach it, one should take the Mule Canyon road which turns east from the Calico highway and follow it to a fork where a sign says, "End of Road 2 Miles." Turning right at this point one must drive the rest of the way over a road that is very narrow but not dangerous with a good car and driver.

The history of Borate is even more interesting than that of Calico, especially to a student of mineralogy. It was probably in the year 1882 that a prospector discovered a strange crystalline ore that was white and crumbled easily, and although the miners were doubtful as to its silver content, the locality was soon covered with claims and a quantity of the mineral

was sent to an assayer in San Francisco. This man soon found that the material was calcium borate, a mineral unknown to science. Excited by his discovery he at once called on a friend, W. B. Coleman, who became greatly interested and immediately sent a man to Calico with money to buy all of the claims, which were purchased very cheaply as the assayer's report showed an absence of silver. It is said that the total amount spent was less than $20,000, although Coleman was prepared to pay ten times that amount if necessary.

Among the amusing stories of those days is the tale of the miner who sold one of the claims to the parson for $300, pretending that it was a silver property. When he heard that a man from Frisco was paying more than that, he at once went to the parson, confessed his sin, and prayed for forgiveness. Returning the $300 he took back the deed and immediately rushed over to the buyer who paid him $2,500 for the claim, the real joke being that he could just as easily have had $25,000 if he had only known the value of the calcium borate.

The new mineral was named Colemanite and the total value taken from the Borate mines is said to have been around $60,000,000, so the original investment was not a bad one. The mines were worked until a still larger deposit of the same mineral was found in the mountains near Death Valley, whereupon Borate was abandoned and little is left of the town today. Even the Death Valley mine has now been practically closed in favor of the huge Kernite deposit near Kramer, for Kernite is the most remarkable ore in the world due to the fact that the finished product is much greater in amount than the weight of the original mineral.

The visitor to Borate will find the surrounding hills honeycombed with tunnels, some of them quite dangerous to enter because of the possibility of cave-ins. There is not much crystallized Colemanite to be had and the very interesting Colemanite geodes formerly found there are now rare, but lumps of a massive white material with a slight sheen are still to be had. This is Priceite, a rare mineral with a formula quite close to that of Colemanite but with the proportion of calcium somewhat greater. Another mineral that may possibly be found is Howlite which resembles Priceite at a casual glance but lacks the satiny sheen when viewed in a good light.

The cliffs on the eastern side of the canyon above the ruins of Borate yield some very good Satin Spar. This occurs in veins in rather soft material and good sized pieces can be dug out with a pick.

Near the Satin Spar locality and at the base of the cliff there is a vein of Strontianite. This is mostly massive but small crystals can be found. Crystals of Celestite are also sometimes found, but they are not at all common.

Parties visiting Borate should take water with them as there is none to be had at the mines, and the trip is best made during the spring or fall months. During the summer the heat is intense in the Calico Mountains and there is always danger that a cloudburst will destroy the road, but in the spring the weather is delightful and the collector is sure to return with a load of fine specimens.

I will continue the mineral business as I shall take post graduate work at the Colorado School of Mines. Send for an approval shipment of **Livingstonite, Adularia xled, Tetrahedrite xled, Benitoite xled, Amazonstone groups, Pyrite groups. Send for my Price List.**

ALLAN CAPLAN

Box 144 Boulder, Colo.

SOME OLD LOCALITIES IN CONNECTICUT

By WILBUR J. EWELL

During the past few months, I have received many letters from readers of **Rocks and Minerals** requesting me to relate more of my experiences relative to localities visited on many of my trips. It is a pleasure to comply with these requests and I hope that this article may prove as interesting as apparently my previous ones have been.

During the past 15 years, I have made 445 mineralogical trips, have travelled 21,415 miles, and visited localities in Connecticut, New York, New Jersey, Rhode Island, Massachusetts, Vermont and New Hampshire.

One of the most interesting localities visited, but now probably the most disappointing, is the old abandoned feldspar quarry at Upper Merryall, 5 miles north of New Milford, Conn. This quarry was operated about 45 years ago by the late S. L. Wilson under the name of the New England Mining Co. During its last year of operation Mr. Wilson mined and sold $17,000 worth of gem aquamarine and golden beryl. Other minerals that have been found there were gem garnets, autunite, columbite, tourmaline and others. The garnets were extra large, some weighing one pound each. The largest clear pieces of beryl found there by me cut an aquamarine stone of 6 4-5 carats and a golden beryl of 4½ carats. These stones varied from light to dark color. At the Smithsonian Institution in Washington, D. C., three gem stones from this quarry are on display namely, blue-green aquamarine, No. 1037, 40 carats. The other two are smaller and paler in color, aquamarines No. 781 and 783 weighing but a little over a carat each. The dumps at the quarry are large but very few minerals are now to be found unless one were to do some digging. Unfortunately the quarry is now privately owned and it is difficult to get permission to even visit the locality.

In collecting on old dumps of quarries and mines, I find that on digging deep in them and spreading out the excavated material and leaving it thus for a heavy rain, the water often washes out good specimens. Today, because of the many and often frequent visits by collectors, it is very difficult to find nice minerals on the surface of dumps, hence the reason for digging into them. The owner of one quarry told me that on one Sunday over 200 collectors had visited the locality. Consequently good minerals on the surface of dumps are quickly picked up. Furthermore, it was an easy task to visit localities years ago! nowadays it is quite a task to get permission due to the fact that "collectors" often damage machinery and equipment.

Another interesting locality is a small quarry that was formerly worked for feldspar and quarry at Flanders, 5 miles north of Woodbury, Conn., where good crystals of columbite, torbernite, green and yellow beryls are found.

During the past summer I spent a number of days in Massachusetts searching for lost localities. In the areas examined, the mountains were so steep and rough that little of the ground could be covered in a day. The zoisite locality at Shelbourne Falls, the cummingtonite locality at Plainfield, and the garnet locality at Russel were but three of the localities that were searched for in vain. At the latter locality fine large groups of garnet used to be available.

I have also searched for green garnets and humite at the Tilly Foster iron mine, Tilly Foster, near Brewster, N. Y.; canaanite at East Canaan, Conn.; reddingite and fillowite at Branchville, Conn.; scovillite at Salisbury, Conn.; and danburite at Danbury, Conn., but in no case was I

successful. The localities of course are well known to me but the minerals mentioned are apparently not present any more.

Some of the lime quarries at Brookfield, Conn., yield interesting specimens of mountain leather and calcite crystals. In the extreme northwestern corner of Connecticut, around Kent, South Kent, Lakeville, Salisbury, Sharon, Campbell Bridge and Macedonia Park are hundreds of old abandoned iron furnaces. The ore was limonite and it was mined in the area, especially around Lakeville, and hauled to the furnaces where it was melted down into pig iron. Beautiful colored slag in great quantities can still be seen in the area and especially around the furnaces.

I will say that the following mines and quarries are not worth visiting: Bristol copper mine near Bristol; Copper Valley mine near Cheshire; iron mine at South Kent; nickel mine at West Torrington; feldspar quarry at Branchville; iolite locality at Hungry Hill near Guilford; the two feldspar quarries near Ridgefield; and the quarry at Little Boston near Branchville. All these localities are in Connecticut.

A few years ago quartz was quarried during the winter by farmers during their spare time. Connecticut has hundreds of these abandoned quartz pits from which the quartz was taken out and hauled to Still River and Branchville where it was ground for use as a wood filler, in the manufacture of soap, and as a flux in smelting operation.

The small state of Connecticut had at one time or another mines and quarries which produced gold, silver, zinc, copper ,iron, barite, nickel, feldspar, mica, graphite, garnets, arsenic, lead, bismuth, tungsten (the only tungsten mine east of the Mississippi River), limestone (for lime), sandstone and granite. The few quarries that are still in operation produce feldspar, mica, granite and limestone (lime); the rest with the mines have all shut down.

The history of the Branchville feldspar quarry is quite interesting. It was first found by a minister named Rev. Wm. Dickinson about 1875 (?) who was out walking when he came across an outcrop of some rare phosphates that later were thoroughly studied by Professors Penfield, Brush and Dana of Yale University. The quarry was first opened up by the university for the extraction of the rare minerals; later a Mr. Ward worked it on a commercial basis (he also worked the Ridgefield quarry for quartz, feldspar and mica). Some of the rare phosphates from the Branchville quarry were new minerals and were named as follows: dickinsonite after Rev. Wm. Dickinson; fillowite after a Mr. Fillow who owned the land; fairfieldite after Fairfield County in which is Branchville; and reddingite after the town of Redding which embraces Branchville. When this quarry was working I used to visit it two or three times a week. Practically every collector has one or more specimens from this world famous locality. Fine group crystals of various kinds such as albite, muscovite, apatite, smoky quartz, cyriolite and many others used to occur here. I also found a large twin terminated beryl crystal here and many of the rare phosphates as hureaulite dickinsonite, fairfieldite, lithiophilite, triploidite and others which I could not identify. I should say almost one-half of the minerals taken out of this quarry would have made good specimens. This was a most interesting locality when it was working as there were so many different kinds of minerals occurring here. Here also were some new forms of crystals of apatite. The quarry is small and its dumps are exhausted so that now it is not worth a visit. Three years ago, however, the water was pumped out and a few blasts put in for sample purposes. Operations lasted only three weeks; the men were not paid and then all activities ceased; the quarry is once more filled with water and abandoned.

SELENITE CRYSTALS AT ELLSWORTH, OHIO

By GERALD U. GREENE

A locality renowned for selenite crystals is Ellsworth, Mahoning County, Ohio. Dana mentions the locality in his Textbook also Canfield about 5 miles to the east. Unfortunately, the crystals which were once plentiful here and which found their way into collections all over the world, are apparently no longer obtainable. Crystals are still to be had however but not of the quality which made Ellsworth famous.

The writer came to Cleveland in the spring of 1934. One of his first thoughts was the selenite locality but despite the fact that a number of teachers of mineralogy and geology were in the city, no one could give any information as to the exact locality for the selenites. After the Cleveland Mineralogical Society was organized, it was decided upon that this famous Ohio locality should be reopened and so one Saturday a number of members left Cleveland with the avowed intention of not returning to the city until at least one selenite crystal was found for each member.

Ellsworth is about 60 miles southeast of Cleveland. It is a small community with about one dozen houses and may be reached by means of several highways. Highway No. 45 runs north and south through it. We were directed to go south on this highway from its intersection with another in Ellsworth to the farm of Mr. Emery Matthews who lives in the first house on the west side of the road from the intersection. Fortunately we found Mr. Matthews at home and ploughing and he very kindly gave us permission to visit the locality and information for reaching it. The happy party immediately started down the creek for the clay bank in which the crystals occur.

Editor's Note:—Ellsworth is in the western part of Mahoning County which in turn is in the northeastern part of Ohio, bordering Pennsylvania. The position of Ellsworth is approximately 41 degrees 2' N. Lat. and 80 degrees 55' W. Long.

The clay bank was soon reached and to the surprise of all, hundreds of small crystals were actually found on the surface of the ground. Unfortunately, they were badly corroded with very few crystal faces left. Picks and shovels were then brought into play in a manner that would put a P. W. A. gang to shame. It would be incorrect to say that a cloud of dust arose and blotted out the afternoon sun as the clay contained a large amount of water; but it is safe to say that many a blister was raised in trying to remove the wet, heavy chunks of mud.

Larger and better crystals were found a few inches from the surface but most of them had their crystal faces corroded. A few small ones, about 1-4 inch long, were of good quality. However, the entire party was satisfied with the finds and we soon left with the intention of returning at an early date to continue excavating for the layer of blue clay which is said to contain the large perfect crystals.

Since the first trip, made in the spring of 1935, the writer has visited the locality several times and has obtained hundreds of crystals. Of these, however, only one is considered to be first class; it is a beautiful crystal, about 2 inches long, and almost entirely transparent.

The best crystals are found in the blue clay which occurs in layers between layers of yellow clay. The blue layers are found at various depths but all blue clay does not carry selenite. The exposed bank is about 40 feet high and perhaps 100 feet wide.

During the early part of October, 1936, another trip was made to the locality by the writer and an old gentleman was met who was exploring the area. He stated that about 50 years ago a friend of his had obtained one bushel of large perfect crystals which sold for $40. He fur-

ther said however, that the topography had so changed that he was unable to find the spot where the crystals had been found. Several slides had occurred on the face of the bank and the bed of blue clay has only been located in the slide. Since several feet of the face has slipped, it would require several days to dig through the slide to the bed in place.

It is stated by the older residents that the best selenite crystals which were obtained about 50 years ago, came from a face exposed by stream action about 100 feet west of the face which is now exposed. This older face is just across a small gully and is now heavily wooded. At that time the present bank was timbered and no crystals were exposed. The stream, however, started cutting in the present place after the timber had been cut off. As is usual in clay banks, slides occur and are washed away and thus the present bank was formed. The present face shows three slides, which in time, undoubtedly, will be washed away and new slides will occur. The bank has never been worked for the clay, only for the selenite crystals by occasional collectors.

It is interesting to speculate on the origin of the selenite. A few hundred feet west of the bank, a bed of low grade coal containing pyrite occurs. This, of course, is the source of the sulphate radical in the selenite. Sandstone beds containing limestone occur above the coal seam. This furnishes the other constituent. Capillary action and the flow of ground water do the rest.

In the writer's opinion the crystals are still forming. During wet seasons the water seeping through the bank is unsaturated with calcium sulphate and tends to corrode the crystals. During dry seasons the water becomes saturated and continued evaporation causes the crystals to form. Clay which was picked over a year ago was found to contain hundreds of minute crystals. Furthermore, in one spot where the writer dug last year with negative results, good crystals were found this year.

Gypsum is found elsewhere in the vicinity. It is reported from clay banks near Canfield. The writer found a few small crystals near the road between Ellsworth and Canfield. It is also found in clay on the shore of Lake Erie. Gypsum rosettes have been found near Kirkland, about 15 miles from Cleveland.

Editor's Note:—Samuel Robinson, in his *Catalogue of American Minerals with their Localities*, published at Boston in 1825, gives the following locations for selenite in Ohio. 'Near Marietta; in alluvial deposits on the banks of the Sciota River; in Trumbull County at Poland, in fine crystals, resembling those from Oxford, Eng., and in Ellsworth, in perfect rhomboidal crystals." p. 235).

But Ellsworth is in Mahoning County.

Mr. George N. Sauer, a subscriber from Dayton, Ohio, places our mind at ease with the following statement: "Extracts from *History of Ohio* (5 vols.) by Charles B. Galbreath (1925). Trumbull County was formed in 1800. (Vol. 1, p. 434). It embraced the whole N. E. corner of Ohio; the whole of Western Reserve. Mahoning County was taken from portions of Columbiana and Trumbull Counties, March 1, 1846. (Vol. 1, p. 385). Hence since 1846 Ellsworth is in Mahoning County."

UNUSUAL GEMS
BOUGHT AND SOLD
Stephen Varni Co.
584 Fifth Ave., New York

JOHNS GEM CUTTER
Complete Machine for Cutting Cabachon or faceted gems.
Send for FREE folder R or send 25c for 20 page illustrated, interesting booklet, with complete instructions. Refunded when you order.
THE JOHNS COMPANY
Sappington, St. Louis Co., Mo.

GEORGE B. GOODWIN
Glacial Pebbles
Selected Minerals
617 North Broadway
Milwaukee, Wisconsin

A UTAH OUTING

By C. J. RORDELL

On May 23, 1937, the Utah group of the Rocks and Minerals Association met at Barrett Hall, Salt Lake City, from which point a caravan of six cars, under the direction of Professor Junius J. Hayes, proceeded for the Pelican Point calcite quarry. The quarry is about 35 miles south of Salt Lake City and about 7 miles west of Lehi; Pelican Point itself is on the northwesterly shore of Utah Lake, a fresh water lake lying in the basin of Utah Valley. Utah Lake is 45 miles long and 15 miles wide whose chief tributaries are Provo River, Spanish Fork Creek and American Fork Creek. From earliest time, the lake has teemed with fish and its shores were favorite camping grounds for the Indians of the great Basin Region; many arrow heads and chippings have been found to substantiate this. Mr. John Hutchings of Lehi has a fine collection of these Indian relics; he is also an anthropologist of note with a collection of birds and birds' eggs of rare vaue.

Time did not permit the R. & M. members to visit Unce John, as Mr. Hutchings is called by all who know him, but the writer and a Mr. Anderl, who had left earlier and over another route, had an opportunity to call on him. We also had an opportunity to visit the clay pits of the Salt Lake Pressed Brick Co. nearby, where a substance resembling thunder eggs was to be found. These were clay bombs whose cores were of iron oxide with sometimes a little pyrite. The two of us spent an interesting hour collecting and breaking open the bombs with the hope that we would have a pleasant surprise for the group when we joined them later at the quarry. No other minerals were encountered on this side trip except a beautiful fragment of orbicular jasper found by Mr. Anderl in one of the gulches between Bluffdale and Camp Williams.

After leaving the clay pits, the two of us headed for Pelican Point but at the junction of two roads, one going towards Mercer and the other down the west side of Utah Lake, we stopped at the ranch house of a Mr. Peterson (he has a gas pump and can supply collectors with gas should they run short) for directions and of course we mentioned our business in his section of the State. We obtained the necessary information and were also pleased to be informed that a black onyx marble quarry was only 4 or 5 miles beyond the Pelican Point quarry and that it was worth a visit. As the time showed 10 minutes to the good before the group were to leave Salt Lake City, we left immediately for the new locality. The road turned out to be very rough and of a steep grade but in due time we arrived at the black onyx quarry. Unfortunate-

CIGARETTE BOXES — ASH TRAYS — BOOK ENDS — PICTURE FRAMES
CLOCK CASES — SPHERES — INLAY WORK — SLICING — POLISHING
COFFEE TABLE TOPS

Petrified Wood **Onyx Calcite**
Malachite **Labradorite**
Lapis Lazuli **Marbles**
Amazonite **Rock Crystals**

JOHN VLISMAS
Stone Craftsman
Telephone RHinelander 4-0346
244 East 77th Street **New York City, N. Y.**

ly, no one was around who might assist us in locating some interesting minerals and after picking up a few specimens that were in plain sight, we soon left and headed for our main destination.

On arriving at Pelican Point quarry, we found to our dismay that the group had already arrived, in fact they were being addressed by a man whom we later learned was Mr. Cedarstrom, owner of the quarry. His talk was most interesting and we all enjoyed it. We learned for example, that minerals and babies had something in common; that pure calcite was ground to a flour and mixed with cow mash for dairy stock—thus resulting in milk rich in calcium which makes babies' bones larger and stronger and also improves their teeth. Calcite ground to wheat-size is also added to laying-mash for hens and result in eggs having snow-white shells for which Utah eggs are known throughout the nation. Pelican Point calcite is further used as a marble for interior decoration and for other purposes. Too much praise cannot be given Mr. Cedarstrom for the many courtesies extended by him to the members of the Rocks and Minerals Association present. Specimens abound at the quarry and he made every effort possible to see that every collector got the best available and there were 24 collectors present.

The calcite of the quarry is a true fissure vein in blue limestone whose trend is slightly northeast and southwest. The vein is said to extend nearly a mile and at the quarry is 20 to 30 feet wide with a nearly perpendicular dip (slightly to the west). Onyx of many colors and shades border both edges of the vein; most of the onyx was of excellent quality that should polish beautifully.

Calcite crystals extend from the onyx borders to the center of the vein, the terminations interlocking. It was noticed that crystals increased in size as they approached the center of the vein. Vugs occur in the vein and in them are the largest and most perfect crystals of calcite.

Marble of many colors, pink, rose-red, lavender, etc., occur as horses in the crystal formation. This marble is of excellent quality for polishing. A brecciated marble also occurs but in limited amounts; this marble was especially beautiful, the loveliest of them all.

Up to this stage of the trip, everyone had been very busy collecting and admiring the beauties of the quarry to think of anything else. During a lull in collecting, the writer passed out some tickets for a free drawing for a lovely blue chalcanthite (from Bingham Canyon, Utah) which he had brought for nose-counting and getting-acquainted purposes.

IRON ARCS $10.00

Postpaid

Light weight, easily portable, and work on one standard automobile battery. Show excellent fluorescence over wide area-excellent for collecting fluorescents. Reference given. Price does not include battery, and cash must accompany order. Satisfaction guaranteed.

EDWIN ROEDDER

Devon Penn.

CHIASTOLITES

From Lancaster, Mass.

Have you a specimen of Chiastolite altered to mica in your collection?

One end polished and varnished.

Alt. to mica, ½" figure (or more) in face 75c
Less than ½" 50c
Regular, not altered, ½" or more 35c
Regular, not altered, less ½ inch 20c

Supply of altered specimens limited.

Postpaid.

JOHN H. BRODRICK

1 Plain St. Clinton, Mass.

The members were informed that the drawing would take place after the party had emerged from the quarry. By this time, Mr. Cedarstrom had regained his breath and proceeded to explain how the quarry was worked and to show us two freaks of nature—blowholes. The quarry had three levels; we collected mostly on the lowest level. The first blowhole was on the second level. Indeed it was a blowhole as a very strong blast of wind came out of it steadily. If the hole was covered with a hand, it created quite a pressure. Mr. Cedarstrom informed us that he had tried capping the hole and using the wind as compressed air for quarry use but that the pressure was not strong enough for the purpose. On this level some of the best onyx specimens were secured.

We then descended to the lowest level and held our drawing. The prize was won by a Miss Gillmore which thrilled her very much as it was a beautiful specimen.

Just as we were about to leave, Mr. Cedarstrom informed us he had one more blowhole to show us which he reserved for the last; that at this hole the formation of calcite was still in progress. And it was truly a most remarkable blowhole. To the writer, a mining man, it looked like either a shaft or winze. But Mr. Cedarstrom said it was a natural opening whose depth he was not able to ascertain. He has proven it to be over 500 feet deep. He had been down into it over 300 feet from which point a weighted rope was lowered another 200 feet without touching bottom; furthermore that rocks dropped down from the above 300 foot mark could be heard rolling downward for more than 20 seconds. The writer accompanied Mr. Cedarstrom a short distance into the blowhole and the latter broke off many protruding calcite formations from the walls which were passed up to the members above until each and every one had his fill. They were clusters of tiny aragonite crystals, colored brown by iron and which phosphoresce a pale blue under the cold-quartz light. The writer called them "calcite flowers." Caves and crevices shot off from the blowhole at intervals and there was a change of formation every 10 or 15 feet in descent, as far as the hole had been explored.

After we emerged from the hole, the group stood on the edge of the dump to admire the beautiful scenery that stretched before them. Utah Lake was about a mile away while the towns of Lehi, American Fork, Provo Bench, city of Provo, and Springville, miles away and on its shores were plainly visible. The beautiful Wasatch Range with Mt. Timpanogos and an azure sky for a background completed the picture — truly a magnificent panorama. After all the specimens were loaded in the cars, our sincere thanks given Mr. Cedarstrom for his many courtesies, and with a last look at the quarry, we left for Saratoga Hot Springs where we were to have lunch.

The original plans called for a dip in the 'hot springs' but after lunch only a few of the members felt like taking to the water so we compromised by spending a few minutes in examining some special minerals brought by the writer (most of which were obtained through **Rocks and Minerals,** its editor, Peter Zodac, and his "How to Collect Minerals"). The director told the writer later that this was the best feature of the trip, excepting the visit to he calcite quarry. Truly the writer is progressing rapidly with the aid of **Rocks and Minerals Magazine.**

At a signal from Prof. Hayes, we were on the way again for our next destination, the 'old ghost camp' of Mercur. We crossed Jordan River which emerges from Utah Lake only a few hundred yards from Saratoga, went up the west slope of Utah Valley to the Pass into Cedar Valley. At the summit Prof. Hayes stopped the caravan just to make certain that everything was well; we then descended into the valley. Good specimens of variscite, jasper and chal-

cedony occur in Cedar Valley but no collecting was done. We passed Fairfield and a short distance further, Camp Floyd Cemeter,y, where we began the ascent to Mercur which is situated in a canyon of Lewiston Peak. After a long climb up a winding road we halted at the mill of the Manning Mining Co. where our director again halted the caravan to see that all was well. Again we were off to the summit of Mercur which was about 25 miles away from Saratoga Hot Springs. At Mercur our plans called for a visit to the Manning mine where cinnabar, orpiment and realgar specimens were to be collected and for which the mine was especially noted. Mercur was also a gold camp, the gold occurring in a bluish shale but was not free milling; it had to be extracted by the cyanide process. Huge cyanide tailing dumps were one of the features of Mercur, before her last ghost period, but now the dumps are dwarfted by the large stripping dumps of the Utah Copper Co. mine in Bingham Canyon, Utah. The ore of Mercur was low grade, averaged about $1.00 a ton, yet millions of dollars were taken out of the mines which at one time boasted the largest mill in the world and in her palmy days "Golden Gate" and "Mercur Con" were synonymous for Homestake and Mother Lode.

The Old Sacramento of Mercur was a mercury mine the metal from which Mercur derived its name. Here the late Secretary of War, Geo. Dern, labored as a young man to build up the foundation of his fortune. Great crystals of orpiment and realgar (ores of arsenic) were plentiful years ago which the writer remembers seeing as he worked in the mine during the early part of the present century.

The revival of Mercur at present is in the reworking of the old dumps as up-to-date improvements in metallurgy has made it possible to work the discarded ores at a profit. However, in the minds of many mining men familiar with the mines of Mercur, there is no doubt that if the mines were again operated they would produce to the extent of their boon days.

We had not been long at the camp when our director contacted a young engineer of the Mercur Mining Co., who very kindly related some interesting facts about the mines and also gave each member some specimens.

Time came for us to leave and one by one the cars descended Mercur Canyon and then headed for home but over a new route which took us through Toole on the west side of the Ophir Range. We reached Salt Lake City at twilight where we parted for home after thanking Prof. Hayes for the very enjoyable and most interesting trip which had not been marred by even the slightest accident.

That night, after a hearty supper which Mr. Anderl enjoyed with the writer, we leaned back in our chairs to talk over the events of the day when suddenly Mr. Anderl said: "Say, Rock Hound, where have you been the past few years when other Rocks and Minerals Association outtings were being held?"

« BOOKS »

Story of the Gems, H. P. Whitlock	$3.65
Getting Acquainted with Minerals, Geo. L. English	2.65
Minerals of N. Y. City, J. G. Manchester	2.65
How to Study Minerals, E. S. Dana	2.15
Hand Book for the Amateur Lapidary, J. H. Howard	2.00
Dana's Text Book, Wm. E. Ford	5.75
Dana's System of Mineralogy	15.50
Fluorescence of Minerals, Chester B. Slawson	.55
Amateur Lapidary, Chas. . Shimmel	1.00
Gilberts, Rudiments of Mineralogy	.25
How to Collect Minerals, Peter Zodac	1.00
The Book of Minerals Dr. A. C. Hawkins	1.50
Fossil Penn Coal Flora of Northern Ill., A. C. Noe. Fine illustrations	1.00
Field Book of Common Rocks, Prof. Fred B. Loomis	3.65
The Mineral World. L. J. Spencer. 163 Colored Illustrations	5.50
Dana's Manual, Wm. E. Ford	4.25

Prices include mailing charge.

JOHN A. GRENZIG

299 Adams St. Brooklyn, N. Y.

AN ACCURATE, EASILY MADE SPECIFIC GRAVITY SCALE

Bq EDWIN ROEDDER, Devon, Pennsylvania

Often one finds need of a specific gravity scale in the determination of minerals, and as specially built scales for that purpose, or ordinary chemist's scales are usually expensive, many mineralogists cannot afford to buy one. The writer has devised a scale that can be made by almost anyone, since the construction is simple and the materials easily available. This scale is more or less unique in that although it is home-made, and materials cost but twenty cents, if it is made carefully it will give two-place accuracy in the final reading of the specific gravity of the specimen weighed.

The materials necessary are listed below:

1 6"x1¼"x1" wood (red gum, white pine, oak, etc.) Almost any wood may be used.

1 14"x5"x¾ wood (red gum, white pine, oak, etc.)

2 3¼" diameter circular celluloid lenses (for stop lights on cars).

1 7¼"x¾"x1-32" "monel metal" (or brass, sheet metal, etc.).

1 ½" or ¾" round head wood screw.

1 1⅛" or 1¼" nut and bolt, approximately 3-32" to ⅛" in diameter.

1 1⅛" or 1¼" flat head wood screw.

Also, one needs a worn out hacksaw blade, a piece of broken triangular file, one yardstick, and a piece of stiff piano wire 2" long.

The Base.

A well made base will give the scale both rigidity and good appearance. Almost any wood will do for this, although oak appears best. The size given in the list of materials is quite suitable, although other sizes may be used with a corresponding change in the other measurements.

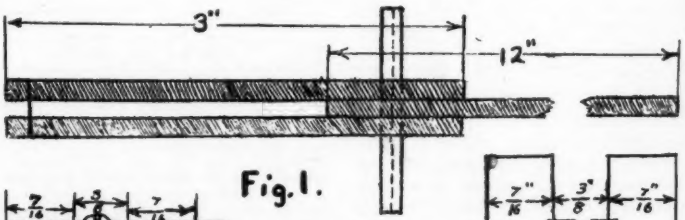


Fig. 1.

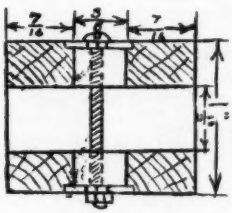


Fig. 2.

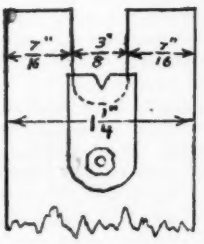


Fig. 3.

Fig. 1. Beam, top view.

Fig. 3. Standard, side view.

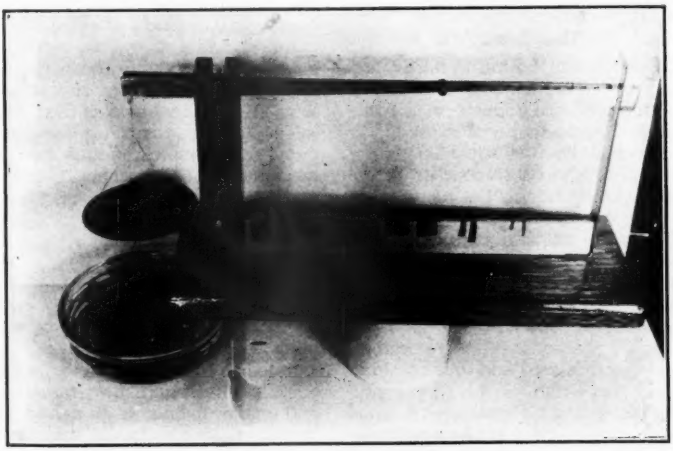
Fig. 2. Standard, top view.

If such a board cannot be found about the house it can be purchased at the lumber yard for a few cents. It should be sanded smooth and the edges beveled.

The Standard.

Since the standard carries the weight of the beam, the weights on the beam, and the weight of the specimen, it should be made fairly firm. It has two cuts or notches made in the end—they are as follows—one cut, 1½" deep and ½" wide, cut in the center of the end of the board, parallel with the 1¼" sides; the other is at right angles to the first, (parallel to the 1" sides), and is only ⅝" deep and ⅜" wide. The illustration will make this clearer. These cuts should be made with a hacksaw, but an ordinary wood saw can be used.

On the outside of the 1¼" sides are placed the two pieces of metal on which the beam rides. These pieces of metal are made from one inch pieces of hacksaw blade. Hacksaw blade is used here not only because a worn-out blade can be obtained for nothing, but because it is so hard that it makes an almost frictionless point with the beam. Most of the accuracy of the scale depends upon the careful construction of these pieces, as the whole beam rests on them. These pieces should be ground square, and the teeth ground off. It is advisable to use one piece from each end of the blade, since the necessary holes are already drilled in these pieces. In th middle of the squared end of these pieces opposite the end with the hole) file a notch about an eighth of an inch deep. The two pieces should be placed together in a vice during the process of filing, and the angle made by the two sides of the notch should be about 80 or 90 degrees. If one does not have the triangular file necessary for this, the job can be done at the local garage or locksmith. The nut and bolt that is purchased, (see list of materials), should be small enough to slip easily thru the holes in the ends of these pieces. A hole is then bored (with a drill or hot nail) thru the standard, parallel with the one inch sides. This hole should be large enough to fit the bolt snugly, and should be bored just below the



The Finished Scale

shallower cut in the standard so that the two metal pieces, when bolted on (one on each side), will have their notches entirely above the cut in the wood. If a little of the wood of the standard is cut out, (so that these pieces are somewhat inlaid), it will be stronger and will look better. The complete standard is then screwed onto the base by a wood screw, (1½" or 1¾" long), coming up from the bottom. The position of this will depend entirely upon the size of the base used—an idea of the position can be obtained from the illustration.

The Balance Indicator.

This is merey a marker to show when the beam is balanced in the weighing of a specimen. A piece of metal suitable for this can usually be obtained from among the scrap metal of a plumbing and heating establishment. The main requirement of this is to have a point of metal, at a sufficient distance from the end of the beam to give free movement, level with the notch in the standard. This can be made of wood, but looks better if made of metal, and can be bent to suit the builder's fancy. It is then bent at right angles at the bottom, a hole drilled in it, and screwed to the base at the right place.

The Beam.

The beam can be made from yardstick very conveniently. Cut off exactly one foot and taper it with sandpaper and knife so that it is ½" to ¾" on one end, and ⅛" to ¼" on the other. One should remember in doing this that although the beam must be strong enough to carry the weights, the lighter it can be made the more accurate the scale will be. As the measurements printed on the yardstick are too coarse for good work, sand them off. When this is done, cut two 3" pieces from the remaining piece of yardstick, and cut or sand them to the width of the larger end of the first piece. Place one of these on each side of the larger piece, overlapping them ¾", and glue overnight, using a vice or several strong rubber bands for pressure. While this is drying, the knife edge, (to rest in the notches already made), can be constructed. If a broken piece of triangular file can not be obtained at the local locksmith or machine shop, a new one can be purchased at the five and ten cent store. The reason that file is used here is the same as for the hacksaw blade—the file is very hard steel, and will make an almost frictionless joint. This piece of steel must be at least 1⅜" long (or over). This has to be ground down on an emery wheel to an angle of 30 to 35 degrees and then sharpened to a good edge. A hole is then drilled or burned in the center, near the top, of the portion of the beam where the three sections overlap, and gradually enlarged till the piece of file can be forced in. The sharpened edge should point straight down toward the lower edge of the beam. "Plastic Wood" or celluloid glue should be forced in the cracks between the knife edge and the beam until the joint between the two is quite solid. It is very important that there be no looseness whatsoever. A few cigar-box nails driven thru the beam at the overlaped portion will strengthen it considerably. A small hole is then drilled in the end of the double portion of the beam, and a piece of stiff piano wire inserted and firmly fastened on both sides (another knife edge here will improve the accuracy slightly). The long end of the beam is then marked in centimeters and millimeters (or inches, eighths, sixteenths and thirty-seconds) in black ink. Centimeters are better because the decimal system can then be used.

The Pans.

The red, circular, celluloid lenses for automobile stoplights are very satisfactory for pans, because they are light. The 3¼" size is best. Three small holes are punched in each, equidistant around the circumference, and a small hole is punched in the center of one. Three threads, one from each of the holes in the edge of the bottom pan are pushed thru the center hole in the upper pan, and

tied into a knot that will not pass back through the hole. After this, three threads, one from each of the holes in the edge of the upper pan, are tied to the bottom of a piano wire hook. This hook can be bent in the form of an "s," with the top part consisting of one-half of a circle, the diameter of which would be ¼". The curve in this top part should be as even as possible. The piano wire used should be stiff so that this hook will not bend under a two or three ounce weight. This hook, in turn, is placed over the piano wire placed in the end of the double portion of the beam. The distance between the upper pan and the bottom of the beam should be about three and one-half inches, while the two parts are about four inches apart. This will cause the lower pan to hang below the base. The writer has found it more convenient to place the whole scale on some sort of support, and let the pan hang below the base, than to use smaller pans, or a long standard. Place the beam, knife edge down, into the notches in the hacksaw blade on the standard, and place a container of water under the lower pan. Before placing the water, it is best to waterproof the threads between the pans by thoroughly rubbing them with paraffin. A support should be used under the base that is short enough to permit the lower pan to be immersed about one inch in water. The beam, the standard, and base should be shellaced or varnished, particularly the beam since it will warp in damp weather. After this dries, the beam should come near to balancing, (with the lower pan in water), but to make the end of the beam come to exactly the right place (pointing directly at the correct place on the balance indicator), place a small weight of copper wire at the correct place along the beam, and clamp it fast.

It is important to note that with this type of scale, one does not need to know the actual weight, in ounces, of the weights he uses. The weights are home-made, and can easily be constructed from lead, (sheet lead), or other material. They should be attached to a wire hook, which in turn is bent at the top to fit on the beam, and can be moved along it.

If these weights are in the form of a wire hook with a weight at the bottom, they will be more accurate and convenient than the type illustrated. They should be of various sizes, ranging in weight as much as the specimens that one will weight—large weights for large specimens, small for small. A rack can be made for these weights by merely taking a piece of the leftover yardstick, cutting it to the right length, sanding it, and placing it between the standard and the balance indicator, as shown in the illustration.

Use of the Scale.

This scale is very easy to use, and readings of the specific gravity of a specimen can be obtained in a few minutes after a little practice. The larger the specimen that is weighed, the better the accuracy of the answer, but one must remember that small amounts of impurities in the specimen also enter in the final answer, and make it inaccurate. The purest material obtainable should be used—crystals are usually better than the massive mineral. Water-soluble minerals should be coated with a thin layer of clear lacquer, and dried, before weighing.

The proceedure is as follows—place the specimen in the upper pan, first making sure that the lower pan is entirely immersed in water. Take a weight that you think is suitable, place it on the beam, and move it back and forth till the beam comes to

STEPHEN VARNI

GEM COUNSELOR

584 Fifth Ave., New York

rest pointing exactly at the mark on the balance indicator. The mark at which the weight is should be taken down on paper. The specimen is then moved to the lower pan. If the specimen is porous, it should be soaked in water; if it contains cavities it should be sprayed with a stream of water until throughly wet, otherwise bubbles of air remain in these cavities to change the answer. When the specimen is thoroughly wet, place it in the lower pan, and make sure that it is entirely covered with water, and that there are no bubbles clinging to it. **Using the same weight as previously,** take the reading again. Let us say the first reading was 15.5, and the second was 11.7. **To get the specific gravity, divide the weight in air by the difference between the weight in air and the weight in water.** That is, subtract from the first weight (the weight of the specimen in air) the second weight (the weight of the specimen in water). Take the answer and divide it into the first weight (the weight of the specimen in air). Using the figures given, subtract 11.7 from 15.5, and divide the larger number (the weight of the specimen in air) by the answer. (Divide the answer 3.8 into 15.5, with the result that the specimen has an S. G. of 4.07). In the determination of minerals the specific gravity is useful, although it cannot be relied upon too much, because it varies a lot with different specimens of the same species.

WILL EXCHANGE
1 R & M Quartz Lamp or
1 Strong Iron Arc Lamp
For Minerals. What have you?
AMERICAN MINERAL EXCHANGE
212 Pacific Ave., Houston, Texas

Representation in a high-class mineralogical journal like ROCKS and MINERALS is a business asset of inestimable value.

Your Card This Size at Only $12 Per Year Will Be a Profitable Investment

SOME NEW FALL SPECIALS

1	Faceted Brilliant cut	Green Zircon	19 Carats
1	"	Cornflower Blue Sapphire	12 "
1	"	Emerald	1½ "
1	"	Clear Citrine	30 "

Extra Heavy ring settings in 14 Kt. while, green or yellow gold, made by hand to mount your stones. Prices include mounting of stone, Ladies $18.00. Gentlemens $24.00.

THE STONE STUDIO

R. Emmet Doherty Mgr. **Peekskill, N. Y.**

THE AMATEUR LAPIDARY

Conducted by ARTHUR KNAPP
1401 Arch St., Philadelphia, Pa.

Amateur and professional lapidaries are cordially invited to submit contributions and so make this department of interest to all.

STONE CUTTING AS A HOBBY FOR WOMEN

By Lillian M. Otersen

I have been interested in collecting minerals for about four years and my husband has been interested in lapidary work as a hobby for about two years. I never believed that I would become interested in cutting and polishing stones myself but after witnessing a practical demonstration by John Vlismas of 244 East 77th Street, New York City on his new Stonecraft Machine I became so enthusiastic I immediately purchased one of his machines and started to work.

After about three lessons I was able to complete a perfect 2" sphere of Amazonite which so encouraged me that I have since completed spheres of Wernerite, Labradorite, Agate, Rock Crystal and finally a beautiful three-inch marble sphere. I am now starting on a 2-⅞" sphere of rutilated quartz which I feel will be the finest one in my collection of over forty spheres.

After Mr. Vlismas had given Mr. Otersen a few lessons in lapidary work he became so interested in the work that he has about filled the house with ash trays, clocks, picture frames, book ends and table tops and he is now planning a mosaic table top of various minerals that we have collected.

Our polished articles as well as our minerals have attracted people from far and near and have started many of them in the collecting of minerals and cutting and polishing their own specimens.

Mr. Vlismas's Stonecraft Machine is one of the finest compact jobs I have ever seen and it is equipped to do most any work that will be necessary to make the many beautiful articles for your own home that you would otherwise be without because of the high prices they bring in the stores.

It is hoped that many more women as well as men will become interested in this finest of hobbies.

ANNOUNCING

The New Stonecraft Cutting and Polishing Machine.
SLICES — GRINDS — POLISHES — MAKES SPHERES
Manufactured by a Professional Stonecraftsman, John Vlismas
of New York City.
Write For Descriptive Literature.

PETER ZODAC, Agent

BOX 29 PEEKSKILL, N. Y.

. . . For The Advanced Collector . . .

I HAVE FOR SALE RARE CRYSTALS AND SPECIMENS
SUITABLE ONLY FOR THE BETTER COLLECTIONS

LUCIAN M. ZELL

522 FIFTH AVENUE **NEW YORK, N. Y.**

DAKEITE

A recently discovered, radio-active, highly fluorescent mineral. We are distributing selected, hardened specimens of this usually crumbling material at 25c, 50c, 75c, $1.00 and $1.50.

Every collector should have a copy of our new fall catalog listing hundreds of minerals, fluorescent supplies, and cutting material. Price 5c or free with an order from this adv.

W. SCOTT LEWIS
2500 N. Beachwood Dr.
Hollywood, California

VERNE C. WHEELER
Roswell N. Mex.
SELECT SPECIMENS OF SYLVITE, selenite, ferruginous quartz crystals, silver ore and other rocks and minerals.
Write for circular.

FRASER & RICHARDS
Formerly with Stephen Varni Co.
Now Located at
156 Fifth Avenue, New York, N. Y.
Dealers in
Precious and Semi-precious Stones and Minerals, Fine Hand Wrought Jewelry.
Specializing in
Platinum, Gold and Silver Work, Designing and Remodelling.

Virgin Valley Opals

A complete assortment of the colorful hydrous silica (common opal) forms found in Virgin Valley of Nevada will receive a welcome in the cabinets of the most fastidious collectors. I have graded assortments, according to size of specimens, as follows:—

$1.25 — $2.25 — $3.00 per assortment, postage paid.

— Satisfaction guaranteed —

Mark M. Foster

DENIO —— **OREGON**

ARE YOUR FILES OF ROCKS AND MINERALS COMPLETE?

Obtain Your Missing Numbers While They Are Still Available. Three Back Numbers Are Already Exhausted; Fourteen More Are Nearing Exhaustion.

Issued Quarterly—4 Numbers Per Year.

Many Issues Over 50 Pages per Number With Fine Illustrations.

Vol. 1 (1926). September, December ..... each 40c
Vol. 2 (1927). March, June, September, December ..... " 40c
Vol. 3 (1928). March, June ..... " 40c
Vol. 4 (1929). March, June September, December ..... " 40c
Vol. 5 (1930). March, September, December ..... " 40c
June (Special Maine Number)—50c
Vol. 6 (1931). March, June ..... " 40c
September (5th Anniversary No.)—50c
December (Special Micro-Mount No.)—50c
Vol. 7 (1932). March, June, September, December ..... " 40c
Vol. 8 (1933). March (Special Opal No.) ..... " 50c
June, September ..... " 40c
December (1st Monthly No.) ..... " 20c
Issued Monthly—24 to 32 Pages Per Issue.
Vol. 9 (1934). January to May (5 numbers) ..... " 20c
July, August, September ..... " 20c
October, November, December ..... " 30c
Vol. 10 (1935). January, February, March ..... " 30c
April to December (9 numbers) ..... " 20c
Vol. 11 (1936). January, February, March ..... " 20c
April, May (Special Fluorescent Nos.) ..... " 30c
June, July, August ..... " 30c
Sept.-Oct. combined (Special Agate No.) ..... " 50c
November, December ..... " 20c
Vol. 12 (1937). January to August (8 numbers) ..... " 20c

Wanted

Copies of September and December, 1928, and une, 1934, **Rocks and Minerals;** early back numbers of **The American Mineralogist, American Journal of Science,** and many out of print books, pamphlets, and bulletins on mineralogy.

ROCKS and MINERALS

Box 29 **Peekskill, N. Y.**

CLASSIFIED ADVERTISEMENTS

WORLD'S BEST WANT AD. MEDIUM FOR MINERALS

Rate 10c per word; minimum 10 words. Remittance must accompany copy in all cases. Advertisers must furnish satisfactory references before their advertisements will be inserted. Forms close the 1st of every month.

BOOKS

HOW TO COLLECT MINERALS by PETER Zodac. A complete guide book for the mineral collector, 80 pp., 15 illus. price $1.00. Rocks and Minerals, Peekskill, N. Y.

HANDBOOK FOR THE AMATEUR LAPIdary by J. H. Howard. 16 chapters covering all phases of gem cutting and polishing, 150 pp., 44 illus., price $2.00. J. H. Howard, 504 Crescent Ave., Dept. R. Greenville, S. C.

EXCHANGE

CUT STONES, CRYSTALS, GEM MATERial, minerals, exchanged. Precious garnet, peridot, and lists: dime. Bill McCampbell, Calexico, Calif.

CURIOS

MY MAIN LINE IS PREHISTORIC AND Modern Indian Curios, also antique fire arms—but in the 37 years in business I have accumulated a large stock of fossils and minerals, and have many really rare and unusual specimens—I do not get out a list of fossils and minerals excepting a few of the commoner varieties which I have complete stock of, so if you are an advanced collector, let me know what you are looking for, I may be able to help you. Address N. E. Carter, Elkhorn, Wisconsin.

MINERALS, GEM STONES, FOSSILS, INdian Relics, Beadwork, Coins, Curios, Books. 35 different fine classified minerals $1.25; 5 different pretty polished gem stones 60c. 10 perfect arrowheads, tribe and location 45c. Illustrated catalog 5c. Two nice fluorescent minerals for 50c. Lemley Curio Store, Northbranch, Kansas.

FLUORESCENT SUPPLIES

SPARTAITE, WHITE, WITH BRILLIANT red fluorescence under iron arc, 3"x3", $1.00, postpaid. Museum size also. Good Willemite, same price, showing brilliant green fluorescence. Edwin Roedder, Devon, Penn.

FLUORESCENT MINERALS: FLUORITE, hyalite, semi-opal, wernerite, and willemite, 15c, 25c, 35c, 50c and $1 each. Peter Zodac, Box 29, Peekskill, N. Y.

FOSSILS

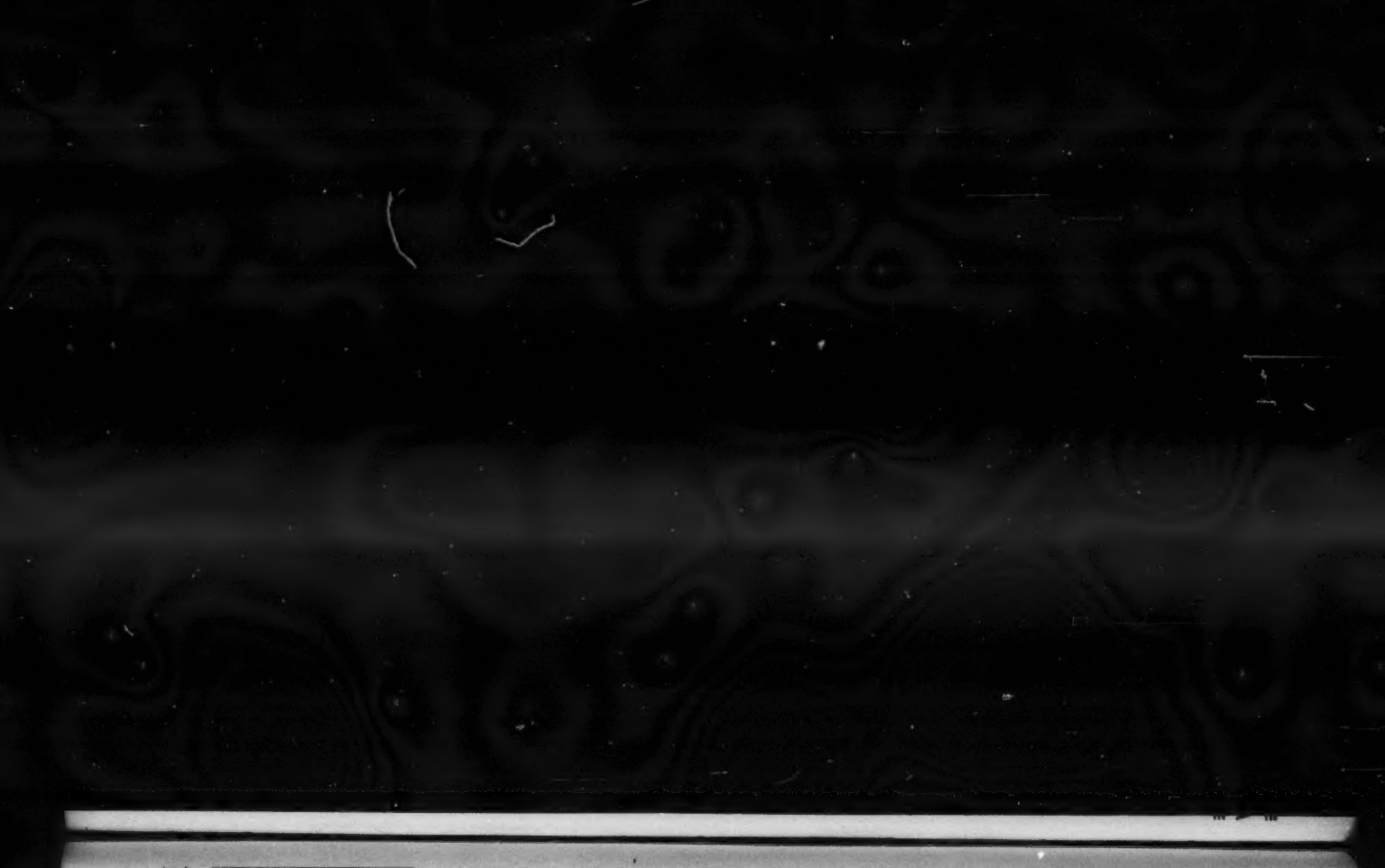
MIOCENE FOSSILS—TEN OR MORE WELL preserved specimens nicely boxed and identified from Yorktown formation, York River, Virginia. Fifty cents. Larger collection, one dollar. Barclay & Sons, Newport News, Virginia.

GEMS

GEMS THAT ARE DIFFERENT — WE have in stock over 20,000 cabochon and faceted stones, including Diamonds, ranging in price from 10c to $50 each, many higher. Many of these GEMS are unusual and just one specimen of a kind. Have made a specialty of Unusual Gems for over 32 years. Visit our showroom overlooking Rockfeller Center, or your correspondence invited. Stephen Varni Co., 584 Fifth Ave., New York.

ROUGH GEMS: Chilean lapis $1.50; African malachite $2.50; Crocidolite—yellow and green $1.50; Red Tiger Eye $2.00; Rhodonite 75c. Prices per pound postpaid. Send $1.00 for trial asst. lot. Grieger, 405 Ninita Parkway, Pasadena, Calif.

THE ONLY WAY HOW TO BUY GEM stones is—ask for my approval selection of inexpensive but attractive stones including green and blue aquamarines, green and pink tourmalines, green obsidian, green African jasper, aventurine quartz, chrysoprase, thomsonite, amazonite, labradorite, star sapphires, quartz topazes, precious topazes, peridots, moonstones, lapis-lazuli, jade, zircons, emeralds, black opals, also many other varieties including all kinds of cabachon and engraved gems at low prices, also several varieties in the rough state. You will be delighted to see my approval selection at these low prices. Thus write for an approval selection now Ernest Meier, 116 Broad Street, New York City, Sales Place, 93-99 Nassau Street, New York City.

BEAUTIFUL BANDED AGATE, POLISHED one side: 1x2 inches, 45c; 1x3, 65c; 2x2, 85c; 2x3, $1.10. Postpaid. No two alike. From Washington and Oregon. E. A. Southwick, 528 S. E. Washington St., Portland, Ore.

LABRADORITE—Gem Quality, $2.00 per pound. Special price in fifty pound lots and over. John Vlismas, 244 East 77th St., New York City.